

way to a style in architecture, in which elegance and novelty of effect shall be co-existent with the most scrupulous attention to points of detail. In doing any thing to repress the study of architecture amongst non-professional persons, architects would be acting most blindly against their interest; hasty and incorrect judgments are the result of want of information, and a slight study of the art would lead to the conviction, that much greater study was needed ere the ability to give a correct opinion could be reached. Perhaps the want is not easily supplied, the information is scattered through a multitude of books, and is gained by the professor only by extreme difficulty and labour. But with the conviction that we have still to learn, and the earnest desire to do so, every difficulty is removed; the art becomes a source of delight, an index to the records of history, an intellectual accomplishment to men and women, alike. The field of the profession is expanded; it enters into the scheme, where building alone was thought of; it is alike called for in the palace and the manufactory. Let architects, therefore, aid in spreading the knowledge of their art, and themselves be prepared to learn, whilst so teaching, and the second half of the nineteenth century will be more remarkable for the prosperous state of architecture, and the estimation in which its professors will be held, than the first, for its thousand copies of old examples, and its ignorance of the pleasures and advantages which the pursuit is so simply able to afford. E. H.

#### THE VENTILATION OF BUILDINGS.

THAT many of our readers agree with us in considering this subject one of the greatest importance is proved by the number of letters relating to it that we receive. Efficient arrangements in this respect universally applied in conjunction with others for draining, cleansing, and an ample supply of water, would effect an improvement in our social condition, and increase the sum of happiness enjoyed by the community, to an extent that cannot be fully estimated. Perhaps we should not be far wrong if we asserted that less than the enormous amount annually expended in England in the maintenance of hospitals and dispensaries, would be sufficient to effect this and render the great majority of these establishments unnecessary, *if we but knew the way*. Let us earnestly strive to find it.

The second volume of the second report published by the Health of Towns Commission, contains twenty-one valuable plates illustrative of the principles of ventilation, accompanying a report from Dr. Reid on the state of Newcastle-upon-Tyne and other towns in the northern coal-mine district. From this report we take the following notes on the subject:—

"The state of ventilation in any apartment depends essentially on three conditions,—the quality of the external air; the quantity that can be made to flow throughout it at a given time, including its mode of distribution, and the regulation of which it is susceptible; whether we regard the temperature communicated to it or the force with which it impinges on the system; and its freedom from any noxious ingredient that may be developed by lamps, candles, fire-places, or any other special cause. Where sanitary measures sustain a pure external atmosphere by effective drainage, cleansing, and prevention of nuisances, one-half of the remedy may be said to be already secured, and without such measures no system of ventilation can be successful. Examples are not wanting where it may be a fair subject of discussion, whether it is not better to suffer a certain amount of deterioration of the atmosphere from within, when this does not proceed to extremities, than to permit a free and overflowing atmosphere from without where it is overloaded with emanations from drains or extreme accumulations of decomposing refuse known to produce disease. Such cases, however, are to be considered as rare exceptions,—a stagnant atmosphere without receiving in general only additional contamination from within, which renders it still more deleterious and oppressive by the impurities communicated to it in all inhabited apartments. It is thought right, however, to advert to the extreme importance of beginning, in all cases where it is practicable,

with a pure atmosphere, as cases have occurred where disease has been propagated by ventilating apertures, selected without reference to the nature of the air which necessarily entered by them, particularly when taken from the surface of the ground, or from sites not regularly cleaned or subject to inspection.

In the northern district, as in other places, little or no ventilation is in general observed in any of the dwellings of the different classes of society beyond those usually accessible by the medium of doors, windows, and fire-places. In such examples of any attempt at systematic ventilation as came under observation, the leading defect was, that though an escape was provided for vitiated air, systematic arrangements were rarely adopted for securing the admission of fresh air.

The consequence of this was, that the discharge could not operate, except with such casual force as the irregular entrance of air permitted. It did not appear to be practically understood that, where there is no entrance there can be no exit, except through the conflicting process of a double current (an ascending and descending movement) through the aperture that ought to act as a discharge alone. Nor did the operation of the fire and fire-flue, in relation to ventilation, appear to have been more specifically investigated than in most other places. Again, where ventilation had attracted considerable attention (and in this mining district certainly many individuals were well aware of the important relation which it bears to health), the means of regulating the quantity, or diminishing the offensive impression produced by local currents, had not been brought into extensive operation. The constant complaints were,—'we have too much air;' or, 'we have too little;' 'the draught is too strong;' or, 'we are oppressed with heat;' 'our feet are cold, but there is a sense of fullness and of headache.' These evidently indicate the necessity of controlling and regulating the ingress to a much greater extent than can be effected by doors or windows alone; of establishing a proper relation between the ingress and the egress, and of proportioning the ingress to the amount of supply, required both for any fire-place that may be in action and for such egress as may be provided.

It fortunately happens that the means requisite for these essential positions are much more simple for individual apartments (which are not densely crowded like public buildings) than for larger structures, for if an aperture for the admission of air of sufficient magnitude be always left open, then it will only be necessary to diminish the extent of opening left for the discharge by a superior aperture, or the opening in the fire-flue, according to the relative rapidity with which it may be required that the ordinary ventilation, or the heating power of the chimney shall act.

In the preceding observations no reference has been made to ventilation by forced currents, induced by any means, except those accessible in almost every apartment, as these are not considered absolutely essential for ordinary purposes, though very desirable when provision is made for them by arrangements incorporated with the original structure. I cannot omit to notice, however, that, where gas is introduced, or any brilliant illumination is employed, there the saturation of the air with moisture, and the extent to which it is vitiated by carbonic acid, demands in general a special provision, in order to secure satisfactory ventilation. Few cases presented themselves where gas is so largely used as in the metropolis, and none such as are so abundant there, more especially in shops and offices, in which the ordinary gas-lamps are lighted during the day (when required for heat and not for light), and the external air excluded as much as possible, that the vitiated air with all its warmth and oppressive deleterious products may be retained, no other source of heat being provided.

Were it more generally known, that the movement of an ascending current from lamps is always accompanied in non-ventilated apartments by a proportionate descent of vitiated air which may have previously supported combustion, and that this descent, though limited at first, may ultimately reach the floor, greater anxiety would be manifested in removing such products by a superior aperture. Nor should it be forgotten, that this ascending power

which gas-lights, candles, and all other warm objects usually have, is in reality a ventilating power, which may, almost universally, with proper management, be made to correct the evil they otherwise induce, and even to assist or command general ventilation. Further, independent of the occasional presence of sulphureous and other offensive products from gas, the quantity of air consumed by excessive illumination produces an amount of carbonic acid and moisture far exceeding that commonly evolved by lamps and candles, and this necessarily demands a proportionate increase of ventilation. In some cases, gas-stoves may be observed, which in very small apartments not provided with fire-flues, often prove more manageable than any other stoves or fire-places, notwithstanding the expense of fuel; but these also, unless the products of combustion are removed by an iron or other tube as systematically as those that proceed from a common coal fire, are still more injurious than lamps, from the lower position in which they are usually placed.

Ventilation is universally observed to be most defective where great destitution prevails, as a low diet renders the system less capable of bearing that amount of air which would otherwise be agreeable. Protection from cold is the first and great desideratum which the constitution demands in any apartment, and the less the supply of the air, where the chemistry of the system is not in high condition and amply supplied with materials for producing internal warmth by those processes that elaborate the products of digestion and apply them in every part of the living system, the less is the extent to which its influence is felt. Hence, in the habitations of the poor, economy in the management and application of fuel, and diffusion to an extent, such as will render the air gentle in its impulse upon the person, become more and more important in proportion as the circumstances of the inmates are reduced. Similar remarks apply in all cases when the constitution has been enfeebled by disease, want of exercise, or a vitiated and too warm atmosphere, even among those whose means command every luxury that can be purchased for their gratification.

Again, the extreme difference in the demands of the same constitution at different periods (passing over the diversity of different temperaments) scarcely satisfied with one or two hundred times that amount of air when it is warm and loaded with moisture, which is abundantly sufficient when comparatively dry, and at a very low temperature, shows the necessity of providing in each individual apartment such openings as may admit at all times of a gentle and regulated movement, though cases constantly occur when, without a wide opened window, or a special ventilating power, an adequate supply of air cannot be obtained.

The application of any measures for forced ventilation in ordinary apartments beyond what can be commanded by their natural warmth, and the influence of the fire, or of the fire-flue in warming the wall, does not appear to have been made a particular object of attention. Were the kitchen fire-flue—or any separate flue immediately adjoining it—to be arranged so as to receive a communication from each individual apartment being made of a magnitude corresponding with their number, great facilities for ventilation could be introduced in all new structures for promoting those natural movements by which ventilation is most satisfactorily sustained.

The ventilation of workshops and manufactories claims as much attention and is fully as important to those who are engaged in them as the ventilation of their dwellings. In the latter they may spend from a third to a half of their life in a vitiated atmosphere, and at all events that period of repose which is often oppressive and unrefreshing from this cause. But in manufactories, more especially where the occupations are sedentary, where the vicissitudes of temperature are extreme, where siliceous, metallic, or other particles are received into the lungs, and induce disease by mechanical irritation, or when acid and corrosive or other deleterious emanations produce still more rapidly dangerous consequences, the subject of ventilation demands a more earnest attention, and is important to the manufacturer who is deprived by early death of skilled and valuable workmen, independent of the